

A mathematical model for fraud prediction and control planning of electrical company clients

Problem raised by **NEOMETRICS**, Madrid (Spain)

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Exposition of the problem:

During this work we will be interested in developing and studying a mathematical model that predicts the possible client frauds of a particular electric company in order to help this company to plan efficient control campaigns.

Indeed, currently, this kind of fraud is relatively common and consists in modifying physically the electric meter in order to reduce the displayed amount of energy consumed. However, this fraud can be easily detected by a simple control *in-situ* which is, unfortunately, expensive. So it is interesting for the considered company to establish whose clients should be visited and the organization of those controls. The model developed during this project will intend to answer to those questions.

More precisely, we will consider a typical binary predictive model, the binary component modelling the *fraud/no fraud* state of the clients. First, we should classify the clients (single person, small/big size companies, industrial area, geographical zone...) and their associated fraud motivation (duration, amount, *modus operandi*...). Then, we will use a real database to determine for each client, considering their characteristics, a risk fraud measure. According to previous risk estimation, we will intend to solve a multi-objective optimization problem in order to plan an *optimal* control campaign (cost of the campaign vs. economical gain for the company). Finally, using databases of real control campaigns, we will validate and check the efficiency of the obtained results.

Scheme of the work to be done:

- 1) Identify the principal client characteristics associated to frauds by using the given bibliography and database.
- 2) Develop a predictive model in order to establish for each client a fraud risk measure. Model coefficients will be calibrated using real data.
- 3) Formulate an interesting optimization problem associated to control campaign planning and determine the way to solve it (global optimization, direct methods...).
- 4) Validate the obtained results by developing numerical experiments considering data obtained during previous control campaigns.